

ABSTRACT OF THE DISCLOSURE

[0048] The invention includes a method of filling gaps in a semiconductor substrate. A substrate and a gas mixture containing at least one heavy-hydrogen compound are provided within a reaction chamber. The gas mixture is reacted to form a layer of material over the substrate by simultaneous deposition and etch of the layer. The layer of material fills the gap such that the material within the gap is essentially void-free. The invention includes a method of providing improved deposition rate uniformity. A material is deposited over a surface in the presence of at least one gas selected from the group consisting of D₂, HD, DT, T₂ and TH. The net deposition rate during the deposition has a degree of variance across the surface which is measurably improved relative to a corresponding degree of variance that occurs during deposition utilizing H₂ under otherwise substantially identical conditions.